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Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	517	380/33.ccls. 380/278.ccls. 705/640.ccls.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/02/17 14:43
L2	311	1 and (private secure$2)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/02/17 14:44
L3	70	2 and (unsecure$2 insecure$2)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/02/17 14:44
L5	30	3 and (purchase transaction)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/02/17 14:45
L6	0	705/640.ccls.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/02/17 14:56
L7	8829	((705/43) or (705/39) or (705/26) or (705/44) or (705/64) or (235/380)).CCLS.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2005/02/17 15:02
L8	4345	7 and (private secure$2)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/02/17 15:02
L9	376	8 and (unsecure$2 insecure$2)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/02/17 15:02
L10	360	9 and (purchase transaction)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/02/17 15:02
L11	287	10 and encrypt$3	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/02/17 15:02
L12	153	11 and (encrypt$3 near2 key)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/02/17 15:04
L13	145	12 and card	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/02/17 15:04

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S1	5216	((705/43) or (705/39) or (705/26) or (705/44) or (705/64)).CCLS.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2005/02/17 15:01
S2	2934	S1 and (private secure$2)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/02/17 15:02
S3	279	S2 and (unsecure$2 insecure$2)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/02/17 15:02
S4	275	S3 and (purchase transaction)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/02/17 15:02
S5	216	S4 and encrypt$3	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/02/17 15:02
S6	124	S5 and (encrypt$3 near2 key)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2005/02/17 15:03

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S4	S3
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S6	s4 and s5
S7	RD
S8	SORT /ALL/pd,a

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☑ **1** Slow, slow, swift, swift, slow. (electronic funds transfer) (Information Technology: A Leap In The Dark?) - Aug - 1987 - Gale Group Trade and Industry Database™

☑ **2** Cirrus agrees to share its ATMs with Plus. (Cirrus System Inc., Plus network) - April - 1989 - Gale Group Computer Database™

☑ **3** Image systems garner NOAC spotlight. (American Bankers' Association's National Operations and Automation Conference) - July - 1989 - Gale Group Computer Database™

☑ **4** Image processing: its role beyond check processing. - March 19 - 1990 - Gale Group Trade and Industry Database™

☑ **5** North of the border. (electronic data interchange and electronic funds transfers in Canada) (EFT/EDI: The Search for Certainties) - July - 1990 - Gale Group Trade and Industry Database™

☑ **6** Safety in numbers: the fraudster foiled? (electronic data interchange security measures) (EFT/EDI: The Search for Certainties) - July - 1990 - Gale Group Trade and Industry Database™

- ☑ **7** Database aspects of integrated circuit cards. - Wntr - 1991 - Gale Group Trade and Industry Database™
- ☑ **8** Electronic transfer of government benefits. - April - 1991 - Gale Group Trade and Industry Database™
- ☑ **9** The cash-free society. (electronic-money systems) - Nov-Dec - 1992 - Gale Group Trade and Industry Database™
- ☑ **10** Security issues in EFT/EDI - Jan/Feb 1993 - Word Count: 1256 - ABI/INFORM®
- ☑ **11** IRE ANNOUNCES NEW LOW COST PRODUCTS TO SECURE ELECTRONIC FUNDS TRANSFERS - June 28 - 1993 - Gale Group Trade and Industry Database™
- ☑ **12** The electronic purse: Go-ahead from Iberian banks and La Poste - Nov 1993 - Word Count: 1172 - ABI/INFORM®
- ☑ **13** Using EDI to improve the accounts payable department - Jan 1994 - Word Count: 2279 - ABI/INFORM®
- ☑ **14** Best practices in treasury controls (part II) - Mar/Apr 1994 - Word Count: 1822 - ABI/INFORM®
- ☑ **15** Smart card used to secure access for funds transfers. (Cash Management) - March - 1994 - Gale Group Trade and Industry Database™
- ☑ **16** Beat the hackers - Apr 25, 1994 - Word Count: 872 - ABI/INFORM®
- ☑ **17** Beyond paper - May/Jun 1994 - Word Count: 2350 - ABI/INFORM®
- ☑ **18** Brave new cyberworld - Sep 1994 - Word Count: 2077 - ABI/INFORM®
- ☑ **19** Double-duty debit cards - Nov 1994 - Word Count: 2129 - ABI/INFORM®
- ☑ **20** Information superhighway looking more and more like a business route. - Nov 18 - 1994 - Gale Group Trade and Industry Database™

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☐ **21** Netscape adds security feature to its WWW server - Nov 21, 1994 - Word Count: 367 - ABI/INFORM®

☐ **22** EFT Issues: Security Brings Visa And Microsoft Into An Unlikely Alliance - Dec 3 - 1994 - Word Count: 585 - Gale Group PROMT®

☐ **23** Latest Internet commerce deal. (Mosaic Communications Corp. and First Data Corp. Electronic Funds Services contract enables banks, companies to use Internet for funds transfer) (Market Watch) - Dec 5 - 1994 - Gale Group Trade and Industry Database™

☐ **24** Wells taps Cybercash for secure Internet payments. (Wells Fargo and Company Inc.) (includes related article on Wells Fargo and Company Inc.'s plan to test an interactive cable service for use by consumers with personal computers) - Dec 22 - 1994 - Gale Group Trade and Industry Database™

☐ **25** Wells Fargo banks on Internet use - Dec 26, 1994/Jan 2, 1995 - Word Count: 339 - ABI/INFORM®

☐ **26** Industry players in hot pursuit of secure Internet transaction mode - Jan 1995 - Word Count: 517 - ABI/INFORM®

- ☐ **27** Banks to give VISA, Microsoft a run for their money. (secure online payment system joint ventures) - Jan 4 - 1995 - Gale Group Trade and Industry Database™
- ☐ **28** Banking on multimedia. - Spring - 1995 - Gale Group Trade and Industry Database™
- ☐ **29** A player goes after big bucks inn cyberspace. (financial advisors Lee Stein founds First Virtual Holdings Inc.) - May 5 - 1995 - Gale Group Trade and Industry Database™
- ☐ **30** A different drummer on the data highway.(David Chaum and his electronic payment company Digicash Corp.)(Money Creators) - May 12 - 1995 - Gale Group Trade and Industry Database™
- ☐ **31** The home banking trend. (includes related article) - July - 1995 - Gale Group Trade and Industry Database™
- ☐ **32** Here comes E-cash, but Washington isn't ready - Jul 3, 1995 - Word Count: 504 - ABI/INFORM®
- ☐ **33** Securing electronic payments over the 'Net - Jul 10, 1995 - Word Count: 1049 - ABI/INFORM®
- ☐ **34** Doing business on the Internet - a question of balance. (includes related article) - August - 1995 - Gale Group Trade and Industry Database™
- ☐ **35** Transaction security. (electronic funds transfer) - August 2 - 1995 - Gale Group Trade and Industry Database™
- ☐ **36** Sun to Provide Computers for Internet Banking; Playing Key Role in Technology Enabling Nationwide Processing Network. - Sep 21 - 1995 - Gale Group Trade and Industry Database™
- ☐ **37** Checkfree asks IPO investors to underwrite $50M offering. (initial public offering) - Sep 25 - 1995 - Gale Group Trade and Industry Database™
- ☐ **38** Out of the box - Nov 1995 - Word Count: 1828 - ABI/INFORM®
- ☐ **39** Payments on the 'Net? How many? How safe? - Nov 1995 - Word Count: 3156 - ABI/INFORM®
- ☐ **40** Hardware vendor offering Internet payment security. (Atalla Corp.) - Nov 8 - 1995 - Gale Group Trade and Industry Database™

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- **41** Defining the electronic future.(Tech Notes) - Dec - 1995 - Gale Group Trade and Industry Database™
- **42** VeriSign hires expert in digital commerce law as a VP.(Michael S. Baum) - Dec 5 - 1995 - Gale Group Trade and Industry Database™
- **43** Electronic commerce at Duke Power - Jan/Feb 1996 - Word Count: 1761 - ABI/INFORM®
- **44** Showdown over e-cash - Jan 1996 - Word Count: 4930 - ABI/INFORM®
- **45** Card firms ratify payment specs - Feb 1996 - Word Count: 830 - ABI/INFORM®
- **46** Money for the information age - Feb 1996 - Word Count: 947 - ABI/INFORM®
- **47** Strategic moves - Feb 1996 - Word Count: 2702 - ABI/INFORM®
- **48** Fighting over Internet payments. (competition to supply electronic payment systems) - Feb - 1996 - Gale Group Trade and Industry Database™
- **49** Protect your money from cybertheft. - Feb - 1996 - Gale Group Trade and Industry Database™

☐ **50** Warning about Internet payment security raises cries of 'false alarm.'(First Virtual Holdings Inc. claims 'sniffer' programs can endanger online transaction security) - Feb 1 - 1996 - Gale Group Trade and Industry Database™

☐ **51** Despite accord, hard work ahead on security standard for Internet. (MasterCard and Visa agreement) - Feb 2 - 1996 - Gale Group Trade and Industry Database™

☐ **52** Payments confidence is key to Internet sales - Mar 1996 - Word Count: 1319 - ABI/INFORM®

☐ **53** Arizona company enters race for secure on-line payment system. (Net1 Inc.)(Future Banking: Trends in Electronic Money and Payments) - March 18 - 1996 - Gale Group Trade and Industry Database™

☐ **54** For EFT, the future is now - Apr 1996 - Word Count: 1404 - ABI/INFORM®

☐ **55** Will SET kill card fraud on the Internet? (Secure Electronic Transaction security protocol) - April - 1996 - Gale Group Trade and Industry Database™

☐ **56** Should you feel secure? (online transactions on the Internet)(The Internet) - April 18 - 1996 - Gale Group Trade and Industry Database™

☐ **57** Race on to come up with Web payment system. (World Wide Web: electronic payment systems)(Special Report) - April 27 - 1996 - Gale Group Trade and Industry Database™

☐ **58** The Net takes its toll. (electronic transactions across the Internet) - May - 1996 - Gale Group Trade and Industry Database™

☐ **59** Money in electronic commerce: Digital cash, electronic fund transfer, and Ecash - Jun 1996 - Word Count: 4172 - ABI/INFORM®

☐ **60** Electronic checks - a detailed preview. - Summer - 1996 - Gale Group Trade and Industry Database™

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☐ **61** ELECTRONIC FUND TRANSFER SECURITY AND SPEED INCREASED 10-FOLD WITH RACAL SECURITY MODULE - June 10 - 1996 - Gale Group Trade and Industry Database™

☐ **62** Key question for emerging systems: where is the money? (electronic money systems)(Future Banking)(Column) - June 17 - 1996 - Gale Group Trade and Industry Database™

☐ **63** Chorus of cheers (mostly) for Internet commerce. (Cyberpayments '96 conference)(Reporter's Notebook) - June 26 - 1996 - Gale Group Trade and Industry Database™

☐ **64** How the cash flows. (electronic payment systems)(includes glossary of acronyms)(Cover Story) - August - 1996 - Gale Group Trade and Industry Database™

☐ **65** Reinventing the bank as an idea factory. (technological advances force changes in banking industry)(FutureBanking)(Column) - August 19 - 1996 - Gale Group Trade and Industry Database™

- ☐ **66** A guide to electronic commerce. (includes related article on financial transactions using small currency denominations) - Sep - 1996 - Gale Group Trade and Industry Database™
- ☐ **67** As the technology advances, security debate still rages. (electronic-money) (includes related article on anonymity and the use of electronic cash) - Dec 23 - 1996 - Gale Group Trade and Industry Database™
- ☐ **68** Beyond credit cards - Jan 1997 - Word Count: 547 - ABI/INFORM®
- ☐ **69** Secure Electronic Transactions standard shows signs of life. - Jan 31 - 1997 - Gale Group Trade and Industry Database™
- ☐ **70** Internet commerce - Feb 1997 - Word Count: 239 - ABI/INFORM®
- ☐ **71** Tighter security loosens the constraints on electronic commerce - Feb 1997 - Word Count: 2402 - ABI/INFORM®
- ☐ **72** Using quality to position EBT services. (electronic benefits transfer) - Feb - 1997 - Gale Group Trade and Industry Database™
- ☐ **73** First Virtual goes off-line to secure on-line payments. (First Virtual Holdings)(FutureBanking) - Feb 18 - 1997 - Gale Group Trade and Industry Database™
- ☐ **74** Surfing the EFT wave - Apr 1997 - Word Count: 775 - ABI/INFORM®
- ☐ **75** Treasury to test tech consortium's e-check system. (Treasury Department plans to use Internet-based electronic checks to pay defense contractors) - April 25 - 1997 - Gale Group Trade and Industry Database™
- ☐ **76** Visa, Mastercard Publish EFT Protocol Standard 06/03/97 - June 3 - 1997 - Word Count: 655 - Gale Group PROMT®
- ☐ **77** Visa, Mastercard Publish EFT Protocol Standard. - June 3 - 1997 - Gale Group Computer Database™
- ☐ **78** Virtually secure. (electronic payment protocol on credit cards may not provide total security) - July - 1997 - Gale Group Trade and Industry Database™
- ☐ **79** Big bucks or lots and lots of tiny bucks - Aug 4, 1997 - Word Count: 1196 - ABI/INFORM®
- ☐ **80** A survey of selected federal regulatory and legal developments in electronic financial services - Nov 1997 - Word Count: 22168 - ABI/INFORM®

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☐ **81** Electronic Funds Transfer Systems. - Annual - 1998 - Word Count: 818 - Gale Group PROMT®

☐ **82** What's in it for merchants?: secure electronic transaction protocol needs a better business case to gain acceptance. - May 6 - 1998 - Gale Group Trade and Industry Database™

☐ **83** Digital Cash Needs to Prove Its Viability, Citi Exec Says. - June 9 - 1998 - Gale Group Trade and Industry Database™

☐ **84** Internet bill presentment and payment: billers and banks empowering each other. - Summer - 1998 - Gale Group Trade and Industry Database™

☐ **85** Statements to the Congress--Roger W. Ferguson Jr. - Aug 1998 - Word Count: 3315 - ABI/INFORM®

☐ **86** On-line insurance serves as confidence-builder - Aug 1998 - Word Count: 785 - ABI/INFORM®

☐ **87** Digital money: electronic cash may make sense. (includes related article on studies on digital money) - August-Sep - 1998 - Gale Group Trade and Industry Database™

- ☐ **88** Playing payments poker - Sep 1998 - Word Count: 4279 - ABI/INFORM®
- ☐ **89** SET: A Made-for-Bankers Message That Some how Never Clicked. - Nov 17 - 1998 - Gale Group Trade and Industry Database™
- ☐ **90** Security implications of electronic commerce: a survey of consumers and businesses - 1999 - Word Count: 5801 - ABI/INFORM®
- ☐ **91** Digital signature management - 1999 - Word Count: 5307 - ABI/INFORM®
- ☐ **92** Payment processing in electronic commerce. - Jan - 1999 - Gale Group Trade and Industry Database™
- ☐ **93** Visa hammers the final nail in SET's coffin.(Secure Electronic Transactions)(Company Business and Marketing)(Editorial) - June 14 - 1999 - Gale Group Trade and Industry Database™
- ☐ **94** Industry Briefs.(Statistical Data Included) - July 28 - 1999 - Gale Group Trade and Industry Database™
- ☐ **95** A Boost from Europe for Card Readers.(smart cards, secure online banking transactions)(Statistical Data Included) - Oct 13 - 1999 - Gale Group Trade and Industry Database™
- ☐ **96** NACHA LEADING PROGRAM TO BRING ONLINE DEBIT TO THE INTERNET.(Internet Council of the National Automated Clearing House Assocation) - Nov 18 - 1999 - Gale Group Trade and Industry Database™
- ☐ **97** Electronic Finance.(Statistical Data Included) - April-June - 2000 - Gale Group Trade and Industry Database™
- ☐ **98** Beyond Digital Wallets. - April - 2000 - Gale Group Trade and Industry Database™
- ☐ **99** Star to offer Internet debit product - May 2000 - Word Count: 318 - ABI/INFORM®

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- ☐ **100** Bank One unveils e-mail money transfer service - May 2000 - Word Count: 756 - ABI/INFORM®

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☐ **101** The changing face of ATM networks - Jul 2000 - Word Count: 2460 - ABI/INFORM®

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☐ **102** Electronic Finance: A Cornerstone to Trade and Compete Internationally.(Statistical Data Included) - July - 2000 - Gale Group Trade and Industry Database™

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Payments on the 'Net? How many? How safe?
Lunt, Penny
ABA Banking Journal , v87n11 , Page: 46-54 , Nov 1995

Research firm Killen & Associates estimates that there will be 7 billion Internet payments made in the year 2000 and 17 billion in 2005. Assuming a typical transaction fee of $1.50, the organizations that dominate Internet commerce will take in $11 billion in 2000 and $26 billion in 2005. Both nonbanks and banks have a head start in the embryonic Internet retail payment system, which so far includes only credit card and off-line debit card payments. The first company to provide secure credit card transactions over the Internet, First Virtual Holdings, Inc., has been growing 15% a week since February, 1995. Banks need to form a policymaking entity that makes rules for Internet commerce. Michael Karlin of Security First Network Bank warns that the banking industry has given away profitable niches before, and it is possible that it could give this one away.

If banks take on as strong a role in payments made on the Internet as they do in the traditional payments world, they can make a lot of money passing funds around and issuing credentials for consumers and merchants. On the other hand, if MCI, AT&T, or other companies decide banks are moving too slowly and that they've got to set up their own on line payment system, they'll handle the profitable business and banks will end up just doing the back end processing, warns Michael Karlin, president and chief operating officer of Security First Net work Bank. If banks don't take the initiative, "money will get sucked out of that piece of the business," says Karlin. A subsidiary of Cardinal Bancshares, Lexington, Ky., Security First's one location, an Internet site, was scheduled to open Oct. 18.

In 1994, $4.6 trillion worth of retail and wholesale purchases were made around the world, according to research firm Killen & Associates, Palo Alto, Calif., which recently produced a report on Internet commerce for MCI. About 13% of those purchases, $595 billion worth, were made remotely, by catalog, TV, electronic data interchange, and on-line networks including the Internet. All of these purchases will start gravitating toward the Internet during the next ten years. While actual Internet purchases were negligible last year, Killen projects that people and businesses will buy $600 billion in goods and services on the Internet in the year 2000 and $1.25 trillion in 2005.

This is backed up by a survey consulting firm Global Concepts Inc., Atlanta, conducted for Visa, MasterCard, and Verifone. While only 32% of Internet users said they currently shop on the Internet, 90.7% said they plan to in the future.

Killen estimates there will be seven billion Internet payments made in 2000 and 17 billion in 2005. Assuming a typical transaction fee of $1.50, the organizations that dominate Internet commerce will take in $11 billion in 2000 and $26 billion in 2005. (The costs will probably be 50% to 60% of that.)

Both nonbanks and banks have a head start in the embryonic Internet retail payment system, which so far includes only credit card and off-line debit card payments. Such nonbank companies as First Virtual, CyberCash, Netscape, and Open Market are facilitating the card-based transactions. But banks'

cardholder and merchant relationships are, so far, intact because the actual credit card clearing and settlement process is the same as it normally is. Except, that is, that the Internet provides new opportunities for hackers and others to steal credit card numbers and commit fraud.

New types of payments are coming to the Internet: electronic checks, on-line debit, and electronic cash. The Global Concepts survey showed that Internet users want such options. Asked to rate on-line payment options one to five, the respondents ranked credit cards 3.66, digital cash 3.33, checking accounts 3.25, ATM cards 2.80, and prepaid cards 2.62.

CREDIT CARDS

Cybershoppers currently can only pay for Internet items with credit cards or with MasterCard and Visa debit cards. They can type their credit card number on the Internet and take the risk that another Internet user will see it. They can also use some type of security.

The first company to provide secure credit card transactions over the Internet, First Virtual Holdings, Inc., San Diego, has been growing 15% a week since February and the company has signed up 750 merchants. Its acquiring bank for now is First USA, although it wants to establish relationships with other banks.

First Virtual holds card and payment information away from the Internet, so the consumer never passes a credit card number over the Internet, only a password. Consumers register credit card information with First Virtual by phone or e-mail, and it verifies this information and subsequent purchases by e-mail. The company is beginning to use digital signatures with its authorization messages.

First Virtual acts as an intermediary between banks and their merchants. "Internet transactions are complicated and there are a lot of things that can happen in the course of Internet commerce where a technical failure is indistinguishable on the buyer's end from merchant fraud," says Chief Scientist Nathaniel Borenstein. "Who's supposed to resolve those things? An Internet intermediary is an alternative to chargebacks."

Encrypted browsers

Every other credit card transaction security system besides First Virtual's involves software that encrypts credit card information. An example is secure "browsers"--software programs that help people move around the World Wide Web. Netscape Communications, Mountain View, Calif., makes Navigator, the best-selling browser. The company also provides a Netscape Commerce Server that allows merchants to deliver documents to, and collect payments from, consumers over the Internet. First Union's merchants use this server.

CyberCash, Reston, Va., also provides encryption software for credit card payments over the Internet. It has signed up 120 merchants (10 of which are actually accepting credit card payments over the Internet) and several banks to use its system, including Wells Fargo; First National Bank of Omaha; Boatmen's Credit Card Bank; Mellon Bank; National Bank of the Redwoods, Santa Rosa, Calif.; U.S. Bank; and Compass Bank, Birmingham, Ala.

CyberCash payment encryption can be used on top of Netscape Navigator or with other software provided by CyberCash and Checkfree, Columbus, Ohio, called an "electronic wallet." CyberCash says its encryption is stronger than Netscape's: while Netscape uses a 52-bit algorithm to encrypt U.S. payments, CyberCash uses a 768-bit algorithm.

Visa and MasterCard: cooperation?

Visa and MasterCard have taken their battle for credit card brand supremacy to the Internet. The associations announced in June that they would jointly issue credit card transaction standards for the Internet that all software companies could use, which would enable banks and merchants to easily let their customers use both Visa and MasterCard cards on the Internet.

Then in September Visa independently announced a set of standards with Microsoft called Secure Transaction Technology specifications. STT is a method of passing payment information around that uses public-key cryptography and digital signatures for security.

Under STT, the consumer will send order information directly to the merchant and credit card information directly to the merchant's bank. "Keeping the payment information separate from the order provides stronger security for both aspects of the transaction," says Steve Herz, Visa's department head for electronic commerce.

Microsoft has not published the source code for STT (a sore point with competitors) and plans to collect a small fee for every transaction. It is incorporating the STT standards in all future software applications related to Internet commerce.

In October MasterCard, along with IBM, Netscape, GTE, and CyberCash announced a different set of technical requirements--the Secured Electronic Payment Protocol. This uses a scheme similar to Visa's. MasterCard says the difference is that its protocol was developed in the open--working with industry standards groups, vendors, financial institutions, and others--was sent out for comment, and provides everything a software developer needs to create SEPP products. Netscape has published the source code for Secure Courier, its SEPP application.

It remains to be seen if the two rivals will support a common standard.

ELECTRONIC CHECKS

"The check is the most popular form of noncash payment," points out John Doggett, director of applied technology at Bank of Boston. "Its volume exceeds that of credit, debit, point-of-sale, and ATM card transactions by three to four times. We'd like to bring the popularity of paper checks to the electronic world."

Doggett heads up the electronic check project of the Financial Services Technology Consortium, an association of banks and technology companies. The group performed the first-ever electronic check transaction over the Internet on Sept. 21.

He hopes the electronic check will be received as a welcome alternative to credit cards on the Internet, not only because people like writing checks, but also because electronic checks are more versatile--they let you send money to a child in college or pay a utility bill, for example.

The consumer will need an electronic checkbook, which currently is a personal computer memory card--a card the size of a credit card but a little bit thicker that holds data and can be inserted in a slot at the back of most laptop computers. In the future it will be a smart card, a card with a computer chip in it. The checkbook, which will be locked with a password, will generate checks, maintain a check register, and store public and private keys.

The small merchant will also need a PC card and the large merchant will need a special processor on its server. Messages passed between customer, merchant, and merchant bank will be secured with public-key cryptography and digital signatures.

The check will then be wrapped in an ACH transaction and cleared through the automated clearing house.

Although some of the lure of the Internet comes from users' ability to go places and do things immediately, customers have responded well to the idea of the one-day delay caused by ACH settlement. "A lot of people have called about this, and they always ask me, 'how long does it take the checks to clear?' We say between 24 and 36 hours. They say, 'that's an improvement over what I have and I don't want the money coming immediately out of my account anyway," says Doggett. "People still hang on to that float idea."

Third-party companies and banks will likely issue electronic checkbooks. "You might buy a modem and a card as a packaging option from a modem manufacturer," Doggett suggests. If an outsider wants to pick up that cost, it's fine with him.

A consultant at Killen & Associates believes bill payment companies like Checkfree will also develop electronic checks and that Telecheck, Equifax, and other check guarantee companies will start guaranteeing checks on the Internet.

People could only initialize their cards (in other words, get public and private keys installed on them) at a bank or its trusted agent, Doggett says. "This is not a complicated task, but it has to be done in a very controlled environment," he says.

The FSTC's goal is to make the electronic check the lowest-cost form of payment available on the Internet. How will the electronic check compete against credit cards, debit cards, and cash payments on the Internet! "I don't see it as a winner-take-all case," says Doggett. "I see it as alternatives of choice." That's certainly the case in the existing world of payments.

ELECTRONIC CASH

Mondex has and Microsoft is developing smart-card-based electronic cash. In their schemes, consumers get a card onto which they can load money, in the form of electronic data, from a bank account. They can do this at a phone, an ATM, or a computer. They can then spend the money on the card on the Internet, at a store, at a phone, or at a vending machine. Several other companies, including CyberCash, DigiCash, and Citibank, are developing electronic systems that replace currency with electronic dollars, with or without a card.

Citibank's Electronic Monetary System is still in the research and development phase, says spokeswoman Nina Das. "This is a pure technology that comprises issuing banks, correspondent banks, a plurality of transaction devices, teller devices, and security, reconciliation, and clearing processes," she says. "It will support network transactions."

Citibank is creating proprietary hardware and software for the system. The hardware will be packaged in personal computers, hand-held devices, and cellular phones. A PC card will initially be used in the system.

CyberCash will soon be able to message money from one checking account to another using the Internet

as the messaging medium and clearing the credits and debits through the ACH. "The money will never leave the banking network," says Magdelena Yesil. Payment requests will be encrypted with the same 768-bit algorithm CyberCash uses for credit cards and sent to CyberCash and/or a bank, which will decrypt the message and honor the request.

DigiCash, based in Amsterdam, is testing a system of anonymous cash payments over the Internet with 4,000 individuals and 70 merchants. The consumer using DigiCash's e-cash software can withdraw electronic cash from a bank and store it on his computer's hard drive in the form of encrypted "coins." The consumer can then spend that money at any Internet merchant accepting e-cash, or send e-cash to a friend or relative. DigiCash has created "blind signature" technology that lets a consumer send money to a recipient without the recipient being able to tell who it's from.

Who can create money?

ABA is not happy with some of these e-cash models. "We have a problem with companies like DigiCash where they're opening up what looks like an account for a customer, where they hold funds and then transmit them to a merchant," says Phillip S. Corwin, director and counsel of operations and retail banking. Only banks should be allowed to create money through fractional reserving or to create demand deposit accounts, he says. "Otherwise you have people establishing banking account relationships without banking regulation or FDIC protection."

Mondex is OK with ABA, however, because its rule is that only banks can issue Mondex cards.

The federal government also has concerns about e-cash and other payments on the Internet. "The changing technology could open up potential for money laundering, counterfeiting, credit card fraud, and other fraud," says Stanley Marris, director of the Treasury Department's Financial Crimes Enforcement Network. This department, called FinCEN, sponsored September meeting in New York of financial services providers, software developers, academics, consumer representatives, and government officials to discuss electronic payment systems and their impact on public policy.

Another concern is that right now, the government has no way to collect taxes on Internet payments. And with payments moving across state and national borders, it's unclear whose taxes are due on each transaction.

Banks need to take control

As all these different schemes develop and become more structured, "The key question is: Who sirs at the very top of the hierarchy, who is at the root of the whole Internet payments system?" says Karlin at Security First. "Is it the Federal Reserve, is it Microsoft, is it the banking industry? We suggest it should be controlled by the banking industry."

So far, merchants and consumers have had to sign up with a third party to get their transactions cleared.

In the future, all customers and merchants will go to their bank to get their on-line credentials, Karlin predicts. Banks will set up an Internet electronic payment system in which they settle with one another as they do in ACH and ATM switches.

Meanwhile, banks need to form a policymaking entity that makes rules for Internet commerce, he believes. For example, to get public and private keys, a consumer might be required to go to the bank or third party in person, present three forms of ID, and sign a document to move dollar amounts up to

$5,000. Rules should also be made about liability--and soon.

"The banking industry has given away profitable niches before and it's possible it could give this one away," he says. "It would be hard for someone else to take this over, but the banking industry can't sit around waiting for it to happen."

IS THE INTERNET HOPELESSLY FLAWED?

A front-page article in the Oct. 11 New York Times, "Discovery of Internet Flaws Is Setback for On-Line Trade," began with this sentence:

"Newly publicized weaknesses in the basic structure of the Internet indicate that the worldwide computer network may need a time-consuming redesign before it can be safely used as a commercial medium."

The article quoted an MIT professor who said the entire Internet has always been insecure and commerce on it won't be truly safe until it is rebuilt.

Not everybody agrees with this view. "Most of the payment infrastructure we need is already in place," says Bill Orr, editor of the monthly newsletter CyberBanking and a contributing editor to this magazine. The missing link is security for transactions moving over the Internet itself. The design of that link--cryptography implemented primarily in software--is generally accepted and being field-tested. When the end-to-end system is ready for deployment, it will probably yield greater security than present payment systems."

The Internet is no different from other networks like America Online, CompuServe, Prodigy, and the Microsoft Network, says Michael McChesney, president of Five Paces Software, Inc., Atlanta. "If you use security technologies, you can make them secure, if you don't use them, none of them are secure," he says. Five Paces provides secure operating systems for banks that want to offer banking over the Internet.

McChesney agrees that the NFS protocol developed by Sun Microsystems has security weaknesses, but adds, "I'm not aware of one company on the Internet that makes use of NFS." He says his company built a secure version of NFS and sold it to the government.

Public-key cryptography, the most promising means of securing Internet payments, can be compromised if a cyberthief steals someone's private key. But by the same token, a criminal could steal an account number or a credit card number and use it, a risk companies live with every day.

McChesney believes the threat of Internet payment fraud can be prevented with security controls and auditing on the database and operating system itself.

"Before I read one more expert telling me it's impossible to do anything on the Internet," McChesney says, "I'd like to lose the very first dollar to fraud on the Internet."

NET JARGON DECRYPTED

Browser--Software people use to move around the World Wide Web.

Digital signature--A security measure that protects messages sent over the Internet. A message is passed through a one-way cryptographic function (that cannot be reversed) to produce a message digest. When the message digest is encrypted with the sender's private key and appended to the message, it becomes a

digital signature.

Internet--The largest collection of computer networks in the world. Originally used mainly by government and academia, it has 4.8 million computer hosts and 10,000 are added every day--many by commercial enterprises now. An estimated 40 million people are connected to it. A billion e-mail messages are sent over it every month. Electronic commerce on the World Wide Web portion of the Internet is just starting to gather steam.

Private key--A mathematical key kept secret by the owner that is used to decrypt messages or files and create digital signatures.

Public key--A mathematical key that belongs to one person or entity that is available publicly. Public keys are used to encrypt messages or files that can only be decrypted using a matching private key. They are also used to verify signatures that were created with a matched private key.

Public-key cryptography--A method of cryptography that depends o a matched pair of public and private keys. Information encrypted with one key can only be decrypted with the other.

World Wide Web--A method of retrieving information from the Internet. Documents are linked by the use of an Internet protocol, such as Universal Resource Locators, HyperText Transfer Protocol, or HyperText Markup Language, that lets people jump from one document or web site to another.

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Should you feel secure? (online transactions on the Internet)(The Internet)

Rasmussen, Jeremy

Computer Dealer News , Volume: 12 , Number: 8 , Page: 35(1) , April 18 1996

Historically, application products or environments have been accepted into companies at a judicious rate. This gradual uptake period has let many of the bugs and security issues be addressed at a non-critical rate.

Today's new application breed is Internet-enabled, forcing the issue of quality right from the beta release. The limited number of problems so far can be attributed to the software vendor's recognition of the importance of security and reliability. This has heightened the role of quality assurance in the application engineering and testing phases. Vendors are now actively seeking advice on, and scrutiny of, their designs and methodologies by subjecting their products to independent groups of experts at pre-beta stages.

The most common point of security criticism has surrounded on-line Internet transactions - credit card transactions to be specific. Flaws did exist in the first round of browser secure transmission protocols. This fueled the debate on this technology's readiness for Internet electronic commerce, but these flaws should be evaluated on fact and not headline.

Credit card fraud happens every day and accounts for losses in the millions for Canadian financial institutions. So why is it that the latest debit card scam does not get front page news?

Consider the following: consumers feel no hesitancy in faxing or phoning their personal and credit card information to complete strangers at a mail order company; the resources (time, financial, and computational) needed to intercept your transaction outweigh the value of information potential abusers might hope to obtain; and collecting masses of credit card numbers electronically has little value to any criminal.

For businesses using the Internet, fears of targeted attacks are more realistic. Any company bouncing data across the Internet's communal servers is probably already employing two basic strategies: encrypt using a protocol you control; and be aware of the route most of your packets will be taking, preferencing reputable core networks and splitting the routes your packets take.

Safe, secure Internet business transactions are a reality. They are carefully engineered using commercial tools, and are adding competitive advantage to the companies using them now.

On-line credit card transactions are also a reality. The delay we have seen is mainly a result of banks being reluctant to set interim standards. Web server credit card transaction components will be available very shortly, and then vendors will just have to give us reasons to shop on-line.

Jeremy Rasmussen is a principal at Inline Information Services, a Mississauga, Ont.-based Internet consulting firm. He can be reached by e-mail at JeremyR@interlog.com.

Gale Group Trade and Industry Database™

Dialog® File Number 148 Accession Number 8831672

Industry players in hot pursuit of secure Internet transaction mode

Day, Jacqueline

Bank Systems & Technology , v32n1 , Page: 6 , Jan 1995

Demonstrating steady interest in this growing segment, 1994 ended with the alignment of industry suppliers and banks in several Internet-based electronic commerce deals. Security - the most pressing concern associated with putting financial transactions on a public data network - characterized each partnership, indicating that technology vendors, credit card processors, card associations and banks are apparently eager to get to work on the issue and move the financial industry a step closer to actual implementation.

LAST YEAR ENDED WITH THE alignment of industry suppliers and banks in several Internet-based electronic commerce (EC) deals, demonstrating steady interest in this growing segment of the market. Security--the most pressing concern associated with putting financial transactions on a public data network--characterized each partnership, indicating that technology vendors, credit card processors, card associations and banks are apparently eager to get to work on the issue and move the financial industry a step closer to actual implementation.

But the similarities end there. Although each deal is based on an effort to enter the growing Internet transaction market, the companies involved bring different strengths and objectives to their initiatives:

* Microsoft Corp. and Visa International, via an exclusive partnership, plan to lay a new foundation for Internet commerce by combining the Redmond, WA, heavyweight's technological prowess with the San Francisco card association's market share. The specifications for the network security method that the companies plan to codevelop will be released to the rest of the industry--including, if it's interested, Visa archrival MasterCard International.

* First Data Corp.'s Electronic Funds Services (EFS) division and Mountain View, CA-based Netscape Communications Corp. will also share expertise. But their nonexclusive collaboration will rely on Netscape's new Netsite Commerce Server software--which provides an encrypted channel for online transactions--and EFS's credit card payment processing expertise. Their goal? Convince EFS bank clients to offer their merchants Internet-based transaction services, which will be processed by EFS, of Menlo Park, CA. Merchants, in turn, will establish Internet "storefronts" by buying the Netscape software.

* In-market rivals Wells Fargo Bank and BankAmerica Corp. have separate plans to use competing Internet payment services. BofA will run Netscape's data encryption software; Wells will use a similar product from CyberCash, Inc., a four-month-old Reston, VA-based start-up. Both banks will allow credit card data to be transmitted from merchants with which they have existing relationships.

It's three different flavors of Internet access, and with good reason--players are eager to differentiate themselves and put their own spin on secure Internet access in this competitive segment of the EC market. "Fortunately, there are a couple of different approaches," notes First Data svp Chuck White.

One thing that vendors do agree on: Move quickly. "Things are happening very fast in the marketplace," says Carol Coye Benson, svp of advanced payment strategies at Visa. "We certainly wanted to share with people where we stood so people knew what was coming."

Indeed, the Microsoft-Visa alliance stands to have considerable impact on the market. The partnership's stated intention is to develop a new standard for secure Internet-and other network-based transactions on both the cardholder and merchant sides.

"This is an enabling technology," says Microsoft product manager for advanced technology Tom Johnston. "Is technology designed to let other things happen."

The standard's initial release, due out this year, will be based on the Microsoft Windows operating system and work with Visa's VisaNet payment system. Other card networks and software vendors can work with the technology, with the goal that it later becomes an industrywide standard, says Benson.

In contrast, Netscape and CyberCash represent proprietary, product-oriented steps to secure Internet commerce.

Smart card used to secure access for funds transfers. (Cash Management)

Arnette, Denise A.

Corporate Cashflow Magazine , Volume: 15 , Number: 3 , Page: 6(3) , March 1994

Smart card technology can greatly enhance security procedures for large-scale interbank and intrabank funds transfers. Chase Manhattan and IBM, for example, have developed one innovative application of this technology which can be used to prevent fraud in treasury operations. The system operates with the help of smart cards that have access control information embedded on microchips built into their magnetic strips. This type of security system requires only a peripheral device called a magnetic card reader, which is used to apply the checksum algorithm needed to clear a treasury transaction as authentic. There are other applications of smart card technology which could be developed once the technology grows out of its infancy. These applications include the use of smart cards to track the medical history of policyholders of life and health imsurance plans and to control the spread of fake drivers' licenses.

The security of your corporate funds transfers may be in the cards--smart cards that is. Smart cards are plastic cards containing a microchip that can store as much as 6000 bytes of information. Several companies have been working on the technology, and IBM has now produced a multi-application card designed to provide encryption and authentication for high-dollar transactions. According to George Dolan, senior engineer at IBM in Charlotte, NC, IBM's smart card was conceived as an access control device that carries a profile of activities that the holder can and cannot do. "When used in conjunction with our cryptographic input/output unit, the smart card is quite effective at securing large-dollar transactions," he says.

While several banks here and abroad have been using the smart card to protect interbank and intrabank funds transfers. Chase Manhattan appears to be the first to put it in the hands of treasury managers, working with IBM to develop a smart card security enhance merit for its Infocash treasury workstation. Providing adequate security for money transfer systems has been a constant battle for large companies. All sorts of techniques--log-ons, multi-level passwords and authentication and encryption--have been developed to enhance security and subdue corporate anxieties.

Neverthless, fraud continues to make alarming headway. Smart cards may offer new hope.

The chip embedded in the Chase-IBM smart card can authenticate and encrypt information for work-station-initiated funds transfers. Under normal encryption and authentication routines, standard software would read the dollar amount, name of payee and bank account number. and compute a "checksum"--a series of numbers derived by applying an algorithm to the transaction data. This checksum would become the message authentication code that would be entered into the funds transfer initiation software and sent to the bank.

The bank, in turn, would use the same algorithm to compute a checksum based on the transmitted transaction data. If the bank's checksum did not match the authentication code, the transfer request would be rejected.

While this process seems secure, it is possible for someone to copy the authentication software and produce his or her own valid checksums. It is this risk that the smart card attempts to minimize.

The process requires a special magnetic card reader, a $1,200 peripheral device that is attached to the workstation. The checksum algorithm is placed on a computer chip and embedded into the plastic card's magnetic strip.

When an authorized user wants to make a funds transfer, he or she enters the transaction information and runs the card through the reader. The reader, in turn, applies the checksum algorithm on the card to the transaction information to automatically calculate and enter the checksum.

Chase, like a number of other banks, tested the technology internally before introducing the device to customers.

Gene Rao, vice president of transaction security at Chase, admits the smart card is not for every company. "Most customers now using the technology are international in scope and Fortune 50 in size." They are also likely to do a lot with electronic data interchange (EDI).

But Craig Goldman, senior vice president of technology for Chase, sees the technology edging toward a much broader use within corporations. "Not only will these cards improve system security by further restricting access to sensitive systems," he says, adding "they will provide a new alternative for physical security for employees entering business facilities, and they will eliminate the need for money to be used on site."

This latter use is known as an "electronic purse." An employee would buy a block of purchasing power, stored in the microchip. Each purchase would reduce the credit balance.

Bob High, an IBM contract engineer who has worked on this project, sees smart card applications spanning several industries. Health maintenance organizations, hospitals or insurance companies could issue smart cards to members and policy holders.

"The cards could hold a person's entire medical history, including illnesses, medications, billings and insurance coverage," he says. New diagnoses, medication or billing transactions could be added.

States are using smart cards to combat forged drivers' licenses, Mr. High reports.

The technology is still in its infancy, but new applications for industries as varied as insurance, transportation and retail point-of-sale are being explored.

IRE ANNOUNCES NEW LOW COST PRODUCTS TO SECURE ELECTRONIC FUNDS TRANSFERS

PR Newswire , Page: 0628DC011 , June 28 1993

BALTIMORE, June 28 /PRNewswire/ -- Information Resource Engineering, Inc. (NASDAQ-NMS: IREG) today announced an inexpensive line of products which employ multiple forms of encryption technology to reduce risks in electronic funds transfers (EFT). Prior to the development of these products, EFT security has been expensive and complex due to the unique needs of each bank's electronic services. IRE's new products, the AX500, AX200 AND AX100, allows banks and their clients a choice of encryption, message authentication and user authentication to secure funds transfers at prices heretofore unavailable.

IRE's Chairman Anthony Caputo noted: "Corporate clients have varying needs for EFT security. Large corporations require multiple security technologies while smaller corporations can guarantee data integrity with less stringent security. Therefore, financial institutions and their corporate customers, both large and small, can choose from a menu of IRE's certifiably secure products that are commercially reasonable and competitively priced."

AX500 - High Level Security for High Risk Applications

The AX500 uses Encryption Technology to provide three forms of data security: Data Encryption, Message Authentication and User Authentication. To maintain rigorous security, the AX500 automatically manages different encryption keys for each bank with which the corporate client communicates thus reducing cost by sharing the AX500 with multiple banks.

AX100 and AX200 - Simplicity and Low Cost

The AX200 uses Data Encryption to provide medium level security for clients with moderate transaction or dollar volume. Priced at $295, the AX200 is both inexpensive and easy to use, and is ideal for clients who require this level of security.

The AX100, priced even lower at $250, uses Encryption Technology to identify and authenticate remote users so that only authorized users may access the host computer. The PC user simply inserts an IRE I.D. Card, a credit card containing an embedded encryption chip, into the AX100. Authentication is fully automatic, fast and secure since it is based on encryption technology.

Company Background

Information Resource Engineering, Inc., provides technologically advanced, cost-efficient Network Security Systems. IRE products use the Data Encryption Standard (DES), the preferred encryption algorithm for financial institutions internationally. IRE's clients include Citibank, J.P. Morgan, the U.S. Department of the Treasury, the U.S. Internal Revenue Service and AT&T Communications.

-0- 6/28/93

/NOTE: I.D. Card is a trademark./

/PRNewswire -- Roberta Bowersox of Information Resource Engineering, 410-931-7500/

(IREG)

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